



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,732	10/03/2005	Kunhiro Oda	OGOSH40USA	4329
270 7590 04/19/2011 HOWSON & HOWSON LLP 501 OFFICE CENTER DRIVE SUITE 210 FORT WASHINGTON, PA 19034			EXAMINER KIECHLE, CAITLIN ANNE	
			ART UNIT 1733	PAPER NUMBER
			NOTIFICATION DATE 04/19/2011	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@howsonandhowson.com

Office Action Summary

Application No.

10/551,732

Applicant(s)

ODA ET AL.

Examiner

CAITLIN FOGARTY

Art Unit

1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 7, 8, 13-27 and 29-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8, 21-27, 29 and 30 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 7, 14-20 and 31 is/are rejected.
- 7) ☒ Claim(s) 3 and 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of Claims

1. Claims 1 – 3, 7, 8, 13 – 27, and 29 – 31 are pending where claim 1 has been amended. Claims 4 – 6, 9 – 12 and 28 have been cancelled.

Status of Previous Rejections

2. The 35 U.S.C. 112 second paragraph rejection of claim 1 has been withdrawn in view of the amended claims filed February 28, 2011.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Interpretation

4. The claim 1, 7, and 8 limitation of “a tantalum sputtering target having a non-recrystallized structure” is interpreted by the Examiner as a tantalum sputtering target having non-recrystallized structure present in the target, but not necessarily 100% non-recrystallized structure. The dependent claims 2 and 3 support this interpretation because they do not require 100% non-recrystallized structure.

Claim Rejections - 35 USC § 102

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1, 7, 17, 18, 20, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 00/31310 (hereinafter WO ‘310).

WO '310 is applied to claims 1, 7, 17, 18, 20, and 31 as set forth in the October 27, 2010 Office action. Claim 1 has been amended.

With respect to amended instant claim 1, p. 4 line 22- p.5 line 7, p. 9 lines 4-22, and p. 10 line 14-p. 11 line 9 of WO '310 disclose a tantalum sputtering target manufactured by subjecting a molten and cast tantalum ingot to forging, annealing, and rolling, where at least about 80% of the tantalum metal is recrystallized. Therefore, the tantalum sputtering target of WO '310 has a maximum of 20% non-recrystallized structure which satisfies the claim 1 limitation of a non-recrystallized structure.

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
8. Claims 2, 14 – 16, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/31310 (hereinafter WO '310).

WO '310 is applied to claims 2, 14 – 16, and 19 as set forth in the October 27, 2010 Office action since none of the claims have been amended.

Allowable Subject Matter

9. Claims 3 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art does not disclose a tantalum sputtering target where the non-recrystallized structure is 40% or more. It would not have been obvious to modify the prior art to achieve the claimed amount of non-recrystallized structure because the prior art teaches that at least about 80% of the

tantalum metal is recrystallized which is much larger than the recrystallized structure of 60% or less in the instant claim 3. Claim 13 is dependent on claim 3 and would therefore be allowable for the same reasons as claim 3.

10. Claims 8, 21 – 27, 29, and 30 are allowed. The closest prior art does not teach the method step of annealing the ingot or billet at a temperature of 1173 K or less to provide the Ta sputtering target with a non-recrystallized structure. Rather, the prior art of WO '310 teaches that the Ta sputtering target is annealed at a temperature of 950°C - 1150°C (1223 K to 1423 K) which is much higher than the claimed annealing temperature range. Also, the claimed temperature of 1173 K is the recrystallization temperature of the Ta sputtering target and therefore the instant claim 8 requires an annealing temperature that is at the recrystallization temperature or below. On the other hand, WO '310 requires an annealing temperature that is above the recrystallization temperature. Therefore, it would not have been obvious to one of ordinary skill in the art to anneal the Ta sputtering target of WO '310 within the instant claim 8 range because it is below the recrystallization temperature and WO '310 teaches that the target should be annealed at a temperature above the recrystallization temperature.

Response to Arguments

11. Applicant's arguments filed February 28, 2011 have been fully considered but they are not persuasive.

Arguments are summarized as follows:

a. Applicants submit that the disclosure of WO '310 has been misinterpreted in the Office Action dated October 27, 2010. WO '310 discloses a raw material high-purity tantalum metal from which "final products" can be made. WO '310 clearly distinguishes between a raw material high purity tantalum metal and "final products" made from the tantalum metal. One of the "final products" disclosed by WO '310 is "sputtering targets." WO '310 clearly describes a high purity tantalum metal raw material that is subjected to certain required processing to ultimately manufacture a sputtering target and that the target does not consist simply of the raw material high purity tantalum metal without the required processing. Thus, only after the tantalum metal is subjected to the process steps, including final annealing, is a sputtering target created. Referring to the "Detailed Description" section of WO '310, a raw material tantalum metal is discussed and the discussion is limited to the raw material tantalum metal and in no way discloses a "final product" such as a sputtering target. This section of WO '310 discloses that the raw material tantalum must be at least 80% recrystallized, and more preferably fully recrystallized. However, this is with respect to the raw material tantalum metal and not a sputtering target. WO '310 discloses a final annealing step at a temperature for a time sufficient to achieve a complete recrystallization of the tantalum metal. Therefore, with respect to the sputtering target, WO '310 discloses a sputtering target which is completely recrystallized. In contrast, the claims of the present application require a "tantalum sputtering target having a

non-recrystallized structure.” WO ‘310 clearly distinguishes between a raw material high purity tantalum metal and a sputtering target.

b. WO ‘310 discloses Examples where the samples are “fully recrystallized” and teaches that any “unrecrystallized” areas will be limited to “the surface region of the plates” and can be “removed by machining.” Thus, even in the event that unrecrystallized areas exist in the rolled plates, WO ‘310 teaches that these areas will be completely removed during a machining step which is a step necessary before the “plate” is ultimately converted into a “sputtering target.”

c. If one of ordinary skill in the art were to follow the teachings of WO ‘310 to produce a sputtering target, the end result would be a completely recrystallized structure and not a non-recrystallized structure as required by the claims of the present invention. Thus, WO ‘310 teaches away from the present invention. In addition, Comparative Example 1 of the present application was annealed at 1173 K (900°C) and the structure of the target was substantially recrystallized. When considering this result, if the final annealing temperature of Comparative Example 1 were set to 950°C, 1000°C, or 1050°C as directed by WO ‘310, the structure of the target would certainly be completely recrystallized thereby teaching away from a non-recrystallized structure required by the claims of the present application. It is noted that Table 3 of WO ‘310 discloses plates having been annealed at 950°C and 1000°C beings 98% or 99% recrystallized. Of course, this is before “machining” which would remove any non-recrystallized surface areas from the plates as required by the teachings of WO ‘310.

d. The present invention requires the final working process step to be cold rolling or annealing at a temperature of 1173 K (900°C) or less in which recrystallization will not occur and in which a worked structure will remain. In contrast, WO '310 performs final annealing at a temperature and time sufficient for achieving full recrystallization. The final annealing temperature required by WO '310 is 950 to 1050°C. Accordingly, Applicants submit that the final working process steps of WO '310 do not overlap with those of the present invention and will and are intended to produce different results.

Examiner's responses are as follows:

a. The Examiner respectfully disagrees with Applicant that WO '310 clearly distinguishes between a raw material high purity tantalum metal and a sputtering target and cites claim 18 of WO '310 that discloses a sputtering target (a final product of the invention) comprising a tantalum metal where the metal is at least partially recrystallized. This supports the Examiner's position in the above rejection and the previous Office action that WO '310 discloses a Ta sputtering target that is at least partially recrystallized, and more preferably at least about 80% recrystallized and even more preferably at least about 98% recrystallized and most preferably fully recrystallized as disclosed in p. 5 lines 4-7 of WO '310. It is clear from p. 5 lines 4-7 that the broadest teaching of WO '310 is that the sputtering target is at least partially recrystallized as further supported in claim 18 of WO '310. Therefore, although the preferred embodiment of WO '310 is that the Ta sputtering target is fully recrystallized, the prior art is not limited to the

preferred embodiments and therefore it is still within the scope of WO '310 that the Ta sputtering target is at least partially recrystallized which means that the Ta sputtering target contains a portion that is non-recrystallized structure as recited in the instant claims. See MPEP 2123.

b. The Examiner reiterates that the prior art of WO '310 is not limited to the specific embodiments it teaches. See MPEP 2123. In addition, the Examiner respectfully disagrees with Applicant's interpretation of p. 17 lines 5-6 and repeats the full recitation which is "Should the unrecrystallized areas be limited to only the surface regions of the plate, then they can be removed by machining." This does not imply that all unrecrystallized areas will be removed during a machining step as suggested by Applicant because they may not all be present on the surface. Rather, it merely states that *if there are* unrecrystallized regions present on the surface they *can be* removed by machining. This is not a required step in the invention of WO '310. The Examiner again cites claim 18 of WO '310 which supports the position in the above rejections and the previous Office action by teaching a sputtering target (a final product of the invention) comprising a tantalum metal where the metal is at least partially recrystallized. Therefore, the Ta sputtering target of WO '310 may comprise a non-recrystallized portion.

c. As seen in the above rejection, the Examiner has indicated method claim 8 and its corresponding dependent claims allowable because they claim an annealing temperature of 1173 K (900°C) or less whereas WO '310 teaches an annealing temperature of from about 950°C to about 1500°C which does not

overlap with the temperature range of claim 8. However, method claim 7 and dependent claim 20 stand rejected as seen in the above rejections because they recite an annealing temperature between a recrystallization temperature and 1673 K and thus the annealing temperature range of from about 950°C to about 1500°C as taught on p. 11 lines 5-8 of WO '310 overlaps with the instant claim range. In addition, the structure of the Ta sputtering target of WO '310 would not necessarily be fully recrystallized as supported by claim 18 of WO '310 which teaches a sputtering target (a final product of the invention) comprising a tantalum metal where the metal is at least partially recrystallized. Therefore, the Ta sputtering target of WO '310 may comprise a non-recrystallized portion as recited in instant claim 7 and does not teach away from the instant invention. The "machining" disclosed in WO '310 is discussed above in response b. Finally, the scope of the prior art of WO '310 is not limited to the specific embodiments it teaches and therefore the specific examples of WO '310 do not limit the scope of the invention. See MPEP 2123. Rather, the Examiner has relied on the broadest teaching of WO '310 which discloses a Ta sputtering target that is at least partially recrystallized.

d. The instant claims never require a Ta sputtering target that is 100% non-recrystallized and therefore at least some recrystallization may occur within the scope of the instant invention. As discussed above, the invention of WO '310 has a preferred embodiment of a Ta sputtering target with a fully recrystallized structure. However, the broadest teaching of WO '310 as set forth in p. 4 line 22-

p. 5 line 7 and further supported by claim 18 of WO '310 is a Ta sputtering target that is at least partially recrystallized. Therefore, the annealing temperature range of 950°C to about 1500°C for a time period of about 0.5 hrs to about 8 hrs as taught on p. 11 lines 5-8 of WO '310 would be expected to produce a Ta sputtering target that is at least partially recrystallized as claimed in claim 18. Although the specific examples taught in WO '310 are nearly fully recrystallized, the scope of WO '310 is not limited to the specific embodiments it teaches. See MPEP 2123. Applicant has not demonstrated with factual evidence that the annealing temperature and time ranges of WO '310 would not product a Ta sputtering target with non-recrystallized structure. In addition, the Examiner has not rejected the instant claims which recite an annealing temperature of 1173 K (900°C) or less and therefore the corresponding argument is not relevant to the remaining rejections. Rather, the Examiner argued that WO '310 teaches an annealing temperature of about 950°C to about 1500°C which overlaps with the instant claim 20 range of between a recrystallization temperature and 1673 K.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAITLIN FOGARTY whose telephone number is (571)270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/551,732
Art Unit: 1733

Page 12

/ Roy King/
Supervisory Patent Examiner, Art
Unit 1733

CF